

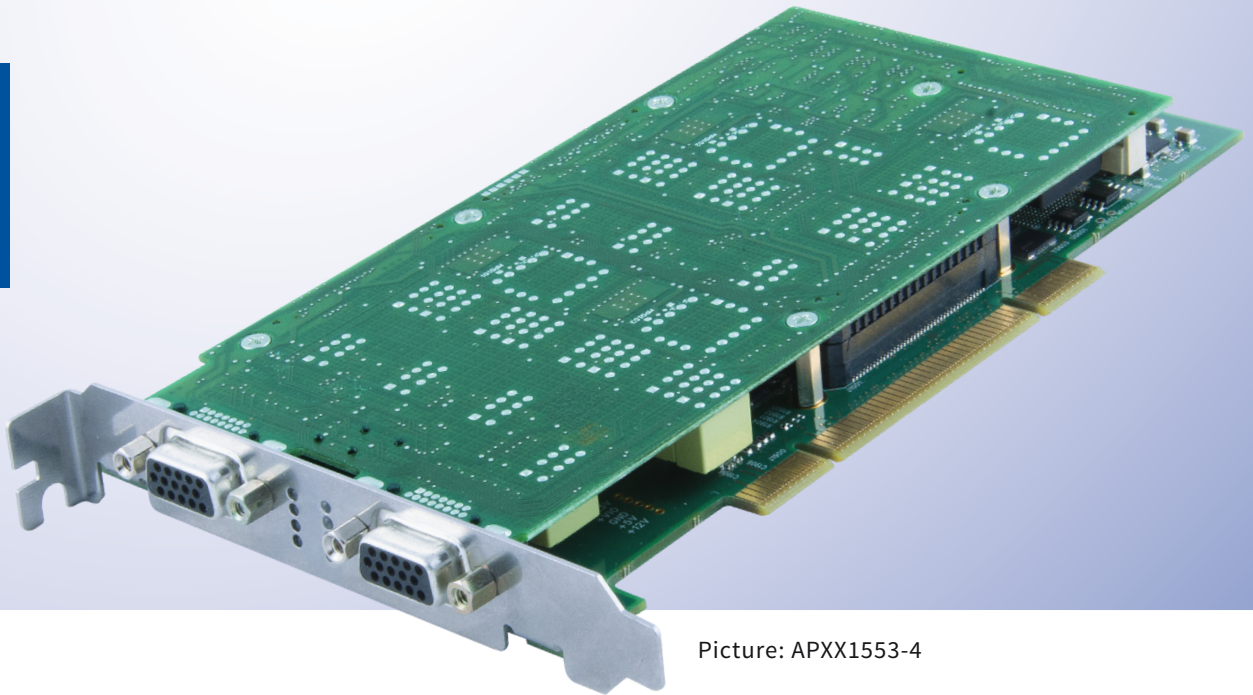


Avionics Databus  
Solutions

# APXX1553-x

Single, Dual or Quad Stream  
MIL-STD-1553A/B Test & Simulation  
Module for PCI

Data  
Sheet



Picture: APXX1553-4

# APXX1553-x

## Single, Dual or Quad Stream MIL-STD-1553A/B Test & Simulation Module for PCI

### General Features

The APXX1553-x is a member of AIM's new family of PCI modules for analyzing, simulating, monitoring and testing MIL-STD-1553A/B databuses.

The APXX1553-x concurrently acts as Bus Controller, Multiple Remote Terminals (31) and Chronological/Mailbox Bus Monitor.

The APXX1553-x-DS versions known as MILScope™, have an onboard A/D converter on the first MIL-STD-1553 channel. The MILScope™ option provides a unique capability to test and verify the MIL-STD-1553 waveform and detect faulty bus conditions without the need of an external oscilloscope.

Versions with reduced functionality (Single Function or Simulator Only) are available as well as extended temperature range variants. All APXX1553-x cards have the capability to handle 8 General Purpose Discrete I/O (GPIO) signals and also offer Trigger I/O.

A full range of MIL-STD-1553 protocol errors can be injected/detected. The APXX1553-x modules can electrically reconstruct and replay previously recorded MIL-STD-1553A/B record files physically to the MIL-STD-1553A/B bus with excellent timing accuracy.

The APXX1553-x offers an interface for 1, 2 or 4 dual redundant bus streams. All versions are short length PCI card formats.

The APXX1553-x modules use AIM's Common Core hardware design utilising multiple RISC processors with 128MB of Global RAM. This offers a scalable and flexible platform for hosting various onboard applications.

APXX1553-1/2-DS only

The use of onboard processing and large memory enables autonomous operation with minimal interaction with the host PC for real time applications.

An onboard IRIG-B time encoder/decoder is included with sinusoidal output and free-wheeling mode for time tag synchronization on system level using 1 or more APXX1553-x cards.

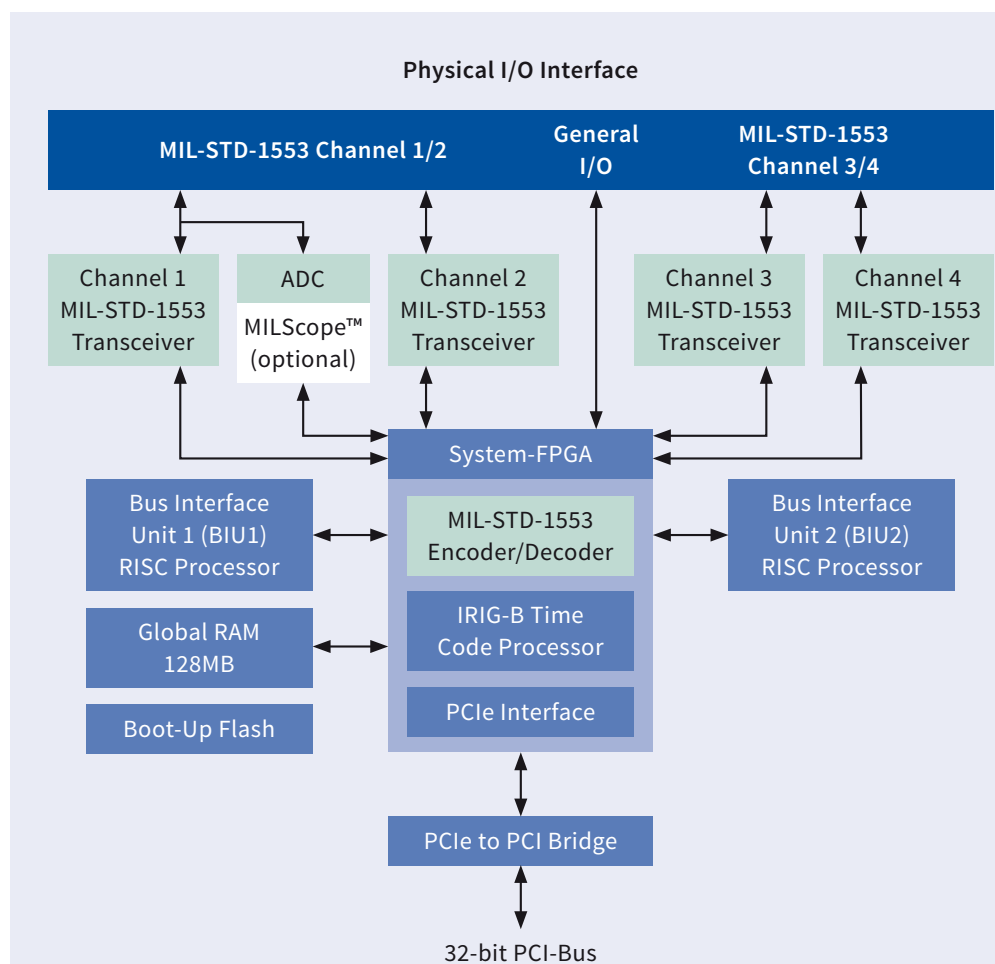
The Physical Bus Interface (PBI) provides programmable bus coupling modes and variable output amplitude to the MIL-STD-1553A/B bus.

Full function driver software is delivered with the APXX1553-x cards in comprehen-

sive Board Software Packages (BSP's) for different Operating Systems. The optional PBA.pro™ Databus Test & Analysis Tool (for Windows & Linux) can also be purchased for use with APXX1553-x modules.

PBA.pro™ software components are available to support the MILScope™ capability of APXX1553-x-DS cards to view and verify the MIL-STD-1553 waveform.

Off the shelf test scripts are available to support the automatic execution of the AS4112 RT Production Test Plan (Protocol and Electrical Tests) and the AS4111 RT Validation Test Plan (Protocol Tests).



## Bus Controller

The APXX1553-x modules provide real time Bus Controller functions on each independent, dual redundant MIL-STD-1553A/B databus channel, concurrently with Multiple RT and Chronological Bus Monitor operation. 2x 400MHz RISC processors, 1x for each single or dual channel Bus Interface unit, provide true simulation of BC operations without host computer interaction.

Key Features of the Bus Controller Mode include:

- Autonomous Operation including Sequencing of Minor/Major Frames
- Acyclic Message Insertion/Deletion
- Programmable BC Retry without Host Interaction
- Full Error Injection down to Word and Bit Level
- Multi-Buffering with Real Time Data Buffer Updates
- Synchronisation of BC Operation to external Trigger Inputs
- 4µs Intermassage Gaps
- Interrupt Generation on BC Transfer Events
- Start on external Trigger Input

## Multiple Remote Terminal

The APXX1553-x modules simulate up to 31 Remote Terminals, including all sub addresses on each MIL-STD-1553 channel, concurrently with BC and Chronological Monitor operation. Alternatively each of the 31 RT's can operate in message oriented Mailbox Monitor Mode to monitor Non-Simulated RT's.

Key Features of the Remote Terminal Simulation Mode include:

- Programmable RT Response Time down to 4µs for each simulated RT
- Programmable and Intelligent Response to Mode Codes
- Full Error Injection down to Word and Bit Level (AS4112 compliant)
- Multi-Buffering with Real Time Data Buffer Updates
- Mailbox Monitor Mode
- Interrupt Generation on RT Events

## Physical Bus Replay

The APXX1553-x cards can electrically reconstruct and replay previously recorded MIL-STD-1553A/B record files physically to the MIL-STD-1553A/B bus with excellent timing accuracy. Record files can be selected for Bus Replay. The additional capability to disable any or all RT responses from the MIL-STD-1553A/B replay enables smart system integration and test to be performed.

## Physical Bus Interface

A Physical Bus Interface (PBI) daughter board provides software programmable transformer or direct coupling with software programmable variable output transceivers and a terminated bus network to enable the direct connection of a single BC or RT device. The coupling to the external bus is software programmable.

## Chronological Bus Monitor

The APXX1553-x modules provide full bus monitoring and analysis with time tagging of all bus traffic with 1µs resolution including response time and gap time measurement down to 250ns concurrently with BC and Multi RT operation.

Key Features of the Chronological Bus Monitor include:

- 100% Data Capture on each Channel at full Bus Rates
- Single Shot, Continuous or Selective Capture Modes
- Autonomous Message Synchronisation and Full Error Detection
- 2 Static/Dynamic Complex Triggers with Sequencing
- Message Filter and Selection Capture
- Bus Activity Recording independent from Trigger and Capture Mode
- Time Tagging
- All Bus Traffic to 1µs
- Intermassage Gaps and Response Time to 250ns
- External Trigger Outputs
- Programmable Response Timeout

## MILScope™ (available as a cost option)

The APXX1553-x-DS versions integrate on 1 channel of the PBI a 2 channel differential Analogue to Digital Converter (ADC) providing up to 50Msamples for primary and secondary data acquisition or up to 100Msamples for either the primary or secondary bus. Accurate measurements of physical bus parameters such as rise/fall time, overshoot, undershoot, pulse width and amplitude, can be triggered by the complex trigger of the Bus Monitor.

## Trigger-/General Purpose Discrete I/O Signals

The Front-I/O connectors provide 1 BC-, RT- and BM-trigger input and 1 BC-, RT- and BM-trigger output for each MIL-STD-1553A/B channel. Additionally up to 5 user programmable General Purpose Discrete I/O signals can be accessed via Front-I/O. All 8 onboard General Purpose Discrete I/O signals, which are user programmable for input or output can be accessed via the board-to-board ribbon cable connector. Voltage levels of all trigger signals and General Purpose Discrete I/O's are TTL compatible whereas the General Purpose Discrete I/O's are designed to handle avionics level as well.

## IRIG-B Time Encoder/Decoder

APXX1553-x modules include an onboard IRIG-B time encoder/decoder with sinusoidal output and free-wheeling mode for time tag synchronisation. This allows synchronization of multiple APXX1553-x modules to 1 common IRIG-B time input source or to the onboard time code generator of 1 APXX1553-x module as the reference for correlation of data across multiple MIL-STD-1553A/B streams.

## Driver Software

The Driver Software is supplied with the APXX1553-x module. A full function Application Programming Interface (API) is provided compatible with 32/64-bit Windows 7/8/10 and Linux. Host applications can be written in C, C++ and Python. A LabView/VI application interface driver is provided.

## Technical Data

### System Interface

5V tolerant PCI bus master and slave, compliant with PCI Standard V3.0 (32-bit, 33/66MHz)

### Processors

1x or 2x 400MHz RISC Processors for BIU(s)

### Memory

128MB Global RAM (DDR2-RAM), 2x 8MBit serial flash memory for BIUs, 64MBit serial flash memory for LCA

### Encoder/Decoder

Up to 4 MIL-STD-1553A/B Encoders/Decoders with full error injection and detection

### Time Tagging

Sinusoidal 46-bit absolute IRIG-B Time stamping with 1µs resolution

### Trigger/General Purpose Discrettes

1x BC-, RT- and BM-Trigger input and 1x BC-, RT- and BM-Trigger output for each channel available with up to 5 General Purpose Discrete I/O's (avionics level) on the front panel Connector

### Physical Bus Interface

1, 2 or 4 MIL-STD-1553A/B Transceivers with variable Output Amplitude, Programmable Bus Coupling modes with onboard terminated Bus Network

### Connectors

32-bit universal PCI bus edge Connector APXX1553-1/2:

9-way D-Sub for Bus connections, 26-way High Density D-Sub for Trigger, General Purpose Discrete I/O and IRIG Time Code I/O

APXX1553-4:

2x 15-way High Density D-Sub for Bus connections, Trigger, General Purpose discrete I/O and IRIG Time Code I/O

## Ordering Information

### APXX1553-1/2

Single Stream or Dual Stream, Dual Redundant PCI bus to MIL-STD-1553A/B

Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor, IRIG-B Time Encoder/Decoder, 8 General Purpose Discrete I/O's (5 on Front I/O, 8 on board-to-board Connector), 128MB Global RAM

### APXX1553-1/2-DS

Single Stream or Dual Stream, Dual Redundant PCI bus to MIL-STD-1553A/B

Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor, IRIG-B Encoder/Decoder, 8 General Purpose Discrete I/O's (5 on Front I/O, 8 on B2B Connector), Digitising Scope for Waveform Analysis and Measurement, 128MB Global RAM

### APXX1553-4

Quad Stream, Dual Redundant PCI bus to MIL-STD-1553A/B Interface:

BC, Multi RT Simulator with Mailbox & Chronological Monitor, IRIG-B Time Encoder/Decoder, 8 General Purpose Discrete I/O's (2 on Front I/O, 8 on board-to-board Connector), 128MB Global RAM

### Simulator Only versions available

BC, Multi RT Simulator with Mailbox Monitor

### Single Function versions available

Chronological Monitor & Mailbox Monitor OR Bus Controller OR Multi RT and Mailbox Monitor

### ACB-PCI-1

Ready Made Adapter Cable (2.0m): From D-Sub to 2 Twinax Connectors PL-75 for all variants of APXX1553-1 cards

### ACB-PCI-2

Ready Made Adapter Cable (2.0m): From D-Sub to 4 Twinax Connectors PL-75 for all variants of APXX1553-2 cards

### ACB-HD15-2

Ready Made Adapter Cable (2.0m): From 15-pin HD-Sub to 4 Twinax Connectors PL-75 for all variants of APXX1553-4 cards

Note: For all variants of APXX1553-4 cards use 2 of ACB-HD15-2/ ACB-HD15-2-F Adapter Cables

### ACB-HD15-2-F

Ready Made Adapter Cable (2.0m): From 15-pin HD-Sub to 4 Twinax Connectors PL-75 and 9-pin D-Sub Connector for Trigger-I/O, IRIG-B and Discrete I/O's for all variants of APXX1553-4 cards

### Dimensions

167.65mm x 106.68mm

### Power Consumption

APXX1553-2-DS:

6,5W (@IDLE) / 8,8W (@50% busload)

APXX1553-4:

4,2W (@IDLE) / 9,3W (@50% busload)

### Operating Temperature Range

Standard 0°C to +45°C ambient

Extended temperature range -15°C to +65°C

### Storage Temperature

-40°C to +85°C

### Humidity

0 to 95% non-condensing

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